

## Claims

- [c1] 1. A filtering apparatus for removing contaminants from a fluid comprising:  
a first conduit for coupling with a fluid container;  
a second conduit for coupling with said fluid container;  
a pump disposed between said first conduit and said second conduit for pumping fluid through said first conduit, said second conduit, and said fluid container;  
a filter disposed between said first conduit and said second conduit for filtering contaminants from said fluid being pumped through said first conduit and said second conduit;  
a compressed fluid-driven flow-reversing means for reversing a flow direction through said first conduit, said second conduit, and said fluid container.
- [c2] 2. An apparatus of Claim 1 wherein said flow-reversing means is further for reversing flow of fluid through said first conduit while maintaining a constant direction of flow of fluid through said pump and said filter.
- [c3] 3. An apparatus of Claim 2 wherein said flow-reversing means includes a dual-alternating output valve.
- [c4] 4. An apparatus of Claim 3 wherein said flow-reversing means is disposed between said pump and said fluid container and further disposed across said first conduit and said second conduit.
- [c5] 5. An apparatus of Claim 3 wherein said dual-alternating output valve is pneumatically driven.
- [c6] 6. An apparatus of Claim 5 wherein said dual-alternating output valve comprises a cylindrical piston.
- [c7] 7. An apparatus of Claim 6 further comprising a means for injecting bursts of air into said first conduit, wherein said bursts of air are less than one-tenth (1/10) of one second in duration.
- [c8] 8. An apparatus of Claim 1 wherein said flow-reversing means further includes an automated switching means for reversing said flow direction after an interval

of less than one (1) second.

- [c9] 9. An apparatus of Claim 8 wherein:  
 said automated switching means comprises a programmable logic controller which is configured to cause said flow direction to reciprocate with a cycle of a flow in one direction for a plurality of seconds, followed by said interval of less than one (1) second in an opposite direction;  
 said fluid is engine oil; and,  
 said first conduit and said second conduit are hoses.
- [c10] 10. An apparatus of Claim 8 wherein:  
 said plurality of seconds is less than ten (10) seconds; and,  
 said fluid is transmission fluid.
- [c11] 11. An apparatus of Claim 8 wherein said programmable logic controller is coupled to and provides control signals to a source of compressed air for pneumatically driving said dual-alternating output valve of said flow-reversing means; and wherein said fluid is a refrigerant used in an air-conditioning system.
- [c12] 12. An apparatus of Claim 11 wherein said bursts of air are repeated at least five (5) times per minute.
- [c13] 13. A flushing apparatus for removing contaminants from a fluid comprising:  
 a first conduit for coupling with a fluid container;  
 a second conduit for coupling with said fluid container;  
 a pump disposed between said first conduit and said second conduit for pumping fluid through said first conduit, said second conduit, and said fluid container;  
 a heater disposed between said first conduit and said second conduit for heating fluid being pumped through said first conduit and said second conduit;  
 a filter disposed between said first conduit and said second conduit for filtering contaminants from said fluid being pumped through said first conduit and said second conduit;  
 a fluid aerator disposed between said first conduit and said second conduit for

providing a controlled injection of bursts of gases into said fluid at a rate of at least five (5) bursts per minute where each burst is less than one (1) second in duration.

[c14] 14.An apparatus of Claim 13 wherein said fluid is fluid used to cool a portion of an automobile.

[c15] 15.An apparatus of Claim 14 further comprising a dual-alternating output valve for reversing a flow direction of said fluid.

[c16] 16.An apparatus of Claim 15 wherein said fluid aerator is coupled to and under the control of an automated air-injection control means.

[c17] 17.An apparatus of Claim 16 wherein:  
said automated air-injection control means further is configured to manipulate a source of compressed air for driving said dual-alternating output valve; and,  
said portion of an automobile is a transmission.

[c18] 18.A method of cleaning contaminants from a fluid container comprising the steps of:  
circulating, in a first direction, fluid in said container through a first conduit, a pump, and a second conduit and a filter;  
stopping a flow of fluid through said first conduit without changing a flow direction of fluid through said filter;  
resuming said flow in said first direction after a time interval; and  
where said time interval is less than ten (10) seconds in length.

[c19] 19.A method of Claim 18 wherein said interval is less than one (1) second in duration.

[c20] 20.A method of Claim 19 wherein said interval is less than one-half (  $\frac{1}{2}$  ) of a second in duration.

[c21] 21.A method of removing contaminants from a container in a vehicle, said method comprising the steps of:  
determining a flow direction of a first fluid through a container on a vehicle,  
which container is configured to facilitate heat transfer from the first fluid to a



[c26]

26.A filtering apparatus for removing contaminants from transmission fluid comprising:

- a first conduit for coupling with a transmission fluid container;
- a second conduit for coupling with said transmission fluid container;
- said transmission fluid container comprising a transmission fluid cooler which is configured to facilitate heat transfer from a transmission fluid to an engine coolant when the transmission fluid flows in a first direction through the transmission fluid cooler;
- where the first direction is a direction of flow of the transmission fluid during operation of a vehicle;
- a pump disposed between said first conduit and said second conduit for pumping transmission fluid through said first conduit, said second conduit, and said transmission fluid container;
- a filter assembly disposed between said first conduit and said second conduit for filtering contaminants from said transmission fluid being pumped through said first conduit and said second conduit;
- said filter assembly including a first stage filter, a second stage filter and an airborne fluid exhaust port;
- a flow-reversing means for reversing a flow direction through said first conduit, said second conduit, and said fluid container, which is driven by compressed air;
- wherein said flow-reversing means is further for reversing flow of fluid through said first conduit while maintaining a constant direction of flow of fluid through said pump and said filter;
- wherein said flow-reversing means includes a dual-alternating output valve;
- wherein said flow-reversing means is disposed between said pump and said fluid container and further disposed across said first conduit and said second conduit;
- wherein said dual-alternating output valve comprises a pneumatically driven cylindrical piston with a first port flow region having a smaller diameter than a central full-width sealing region; said cylindrical piston further having a second port flow region having a smaller diameter than said central full-width sealing region;

wherein said cylindrical piston is pneumatically driven between alternating positions where transmission fluid is permitted to flow from only one output port of said dual-alternating output valve;  
means for injecting bursts of air into said first conduit and said second conduit, wherein said bursts of air are less than a one (1) second duration;  
wherein said flow-reversing means further includes an automated switching means for reversing said flow direction after an interval of less than one-half (1/2) of a second;  
wherein said automated switching means is a programmable logic controller and said flow direction reciprocates with a cycle of a flow in a second direction of a plurality of seconds followed by said interval of less than one-half (1/2) of a second in said first direction, wherein said second direction is opposite said first direction; and  
wherein said first conduit and said second conduit are hoses.